

FOUR NEW SPECIES OF SAPIUM (EUPHORBIACEAE)  
FROM CENTRAL AND SOUTH AMERICA

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Sapium remains one of the least understood of the large genera of Euphorbiaceae in the neotropics. Virtually all of the approximately 100 species in that area are large forest trees and consequently are poorly collected. Furthermore, the genus is highly stenomorphic, that is, the species are separated by relatively few characters. The primary taxonomic problem consists of determining the taxonomic value of those characters that do exist on the basis of an insufficient sample of collections.

Among the species of Sapium yet to be described, the following, which have been identified while working on floristic projects or while doing general determinations of neotropical Euphorbiaceae, are among the more distinctive.

SAPIUM ALLENII Huft, sp. nov. TYPE: Costa Rica. Puntarenas: region between Río Esquinas and Palmar Sur de Osa, climax forest, 30 m, 16 Jan. 1951, Paul H. Allen 5773 (holotype, F-1516348, F neg. 62129; isotype, GH).

Arbor ad 25 m alta; ramuli cicatricibus foliorum prominentibus et stipulis persistentibus. Folia aggregata versus apices ramorum; lamina oblonga-ovata, nervis utroque costae laterae 13-22 late arcuatis infra prominentibus; apice obtusa vel rotundata, plana, margine integra. Spicae laterales, aggregatae, ut videtur bisexuales, partibus masculinis non visis, floribus femineis usque ad 16, non visis, aggregatis. Capsula ovata, stipitata; semina subglobosa, tuberculata, carmina.

Tree to 25 m; monoecious; glabrous throughout; branchlets with prominent leaf scars 3-5 mm in diameter and persistent stipules. Leaves alternate, crowded toward apex of stem; petiole 3-5.5 cm long, the two apical glands opposite or subopposite, cylindrical, to

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2 mm long, at right angles to petiole or somewhat reflexed; stipules deltate, 5-7 mm long, 2.5-3(-5) mm wide, acuminate, hyaline, appressed, persistent; blade membranous or chartaceous, oblong-ovate, 11.5-18 cm long, 4-7.5 cm wide, 2-3 times as long as wide, the midvein prominent below, the connecting reticulum obscure; apex obtuse or rounded, plane; base obtuse; margin entire. Spikes lateral, crowded, below current year's leaves, apparently bisexual, the staminate portions not seen; pistillate portion at maturity 2.5-6 cm long, widely divergent from stem. Pistillate flowers not seen, to 16 per spike, crowded, solitary at basal nodes. Capsule ovoid, smooth, 4-5 mm in diameter, stipitate, the stipe 4-5 mm long, 1-1.3 mm in diameter; seeds subglobose, tuberculate, 3.5-4 mm in diameter, carmine.

This unusual species differs from all Mexican and Central American species of Sapium, except S. lateriflorum Hemsley, by its lateral spikes. The latter species is known only from Mexico and northern Central America and differs from S. allenii in having slenderer twigs without persistent stipules, more widely spaced spikes that never appear crowded, secondary foliar veins that are more strongly ascending, and larger fruits (10-13 mm in diameter vs. 4-5 mm). Among the species of southern Central America, S. allenii most closely resembles S. pachystachys Schum. & Pittier in having thick branchlets with large persistent stipules, long-petiolate leaves with large oblong blades that have numerous secondary veins diverging from the midrib at nearly right angles, spikes with thick rachises, and conspicuously red-arillate seeds. Sapium pachystachys differs, however, in having terminal inflorescences, much larger (10-12 mm in diameter) sessile capsules (stipitate in S. allenii), and a large persistent calyx (vs. a small, membranous calyx at the base of the stipe in S. allenii). In addition, S. pachystachys occurs largely in cloud forest habitats above 1500 m, whereas S. allenii has been collected only below 1000 m.

Additional specimens examined. COSTA RICA. SAN JOSÉ: basin of El General, 675-900 m, March 1940, Skutch 4821 (A, F, NY, US).

SAPIUM DUCKEI Huber ex Huft, sp. nov. TYPE: Brazil. Rondônia: Rio Machado, curso inferior, Jan. 1981, Michael Goulding 1367 (holotype, MG-86867, F neg. 62128).

Arbor ad 25 m alta; ramuli laeves, rubelli. Petioli 4-25 mm longi, canaliculati; glandulae apicales cupulatae, ascendentes, ad petiolum laterale affixi; lamina chartacea, anguste elliptica vel anguste oblonga, nervis utroque costae laterae (10-)14-18 arcuatis aliquantum apice acuta plana; margine integra vel serrulata. Spicae axillares bisexuales vel staminate, floribus masculinis 6-8-aggregatis, calyce bilabiato staminibus 2, floribus femineis 4 vel 5. Capsula obovoidea sessilis; semina globoso-obovoidea, plus minusve complanata.

Tree to 25 m; monoecious; glabrous throughout; branchlets terete, smooth, often reddish. Leaves alternate; petiole 4-25 mm long, deeply canaliculate, slender, the 2 apical glands subopposite, cupular, ascending, 1.2-1.8 mm long, attached laterally to petiole; stipules deltate, ca. 2 mm long, 1.6-2 mm wide, appressed, tardily deciduous; blade chartaceous, narrowly elliptic, oblanceolate, or narrowly oblong, 4-10.5 cm long, 2-3.7 cm wide, 2-3.8 times as long as wide, olive-green above, lighter green or brown below; midvein conspicuous, prominent below, the secondary veins (10-)14-18 per side, arcuate, much thinner and less conspicuous than the midvein, connected by a prominulous reticulum; apex acute, plane; base rounded or obtuse; margin entire or serrulate. Spikes axillary, (4-)6-9 cm long, slender, bisexual or staminate. Staminate flowers in groups of 6-8, the subtending bracts broadly deltate, 0.8-1 mm long, obtuse, the margin hyaline, minutely erose, biglandular, the glands oblong, 2.2-3 mm long, 0.7-1 mm wide; calyx cupular, ca. 1 mm long, deeply 2-lipped; anthers 2. Pistillate flowers 4 or 5, solitary at basal nodes, bracts as in the staminate flowers, the glands reduced, 0.9-1.2 mm long, ca. 0.5 mm wide; calyx 2-2.5 mm long, deeply 3-lobed, the lobes ca. 1/2 the length of the total; styles early dehiscent. Capsules obovoid, sessile, 7-8 mm long, 8-10 mm in diameter; seeds white, globose-obovoid, pinched distally into a narrow horizontal ridge, slightly compressed laterally.

Among a set of specimens of Euphorbiaceae recently collected by Dr. Michael Goulding of the Museu Paraense Emilio Goeldi in Belém, Brazil, in preparation for an atlas of Amazonian floodplain fruits, was an unusual *Sapium* that does not match any described species. I was able to match the specimens, however, with four sheets at the Field Museum from the state of Pará that had been annotated *Sapium duckei*, an unpublished name ascribed to Huber. In addition, fragments and photos of

putative type material at MG collected by Ducke are at F. As far as I can discover, this name has never been published. In order to make the name available for the atlas, I shall describe the species here and retain Huber's epithet, both to honor Adolfo Ducke, one of the premier botanists of the Amazonian region, and to assure the minimum possible nomenclatural upset should it later be found that Huber's name was in fact published.

This species is easily recognized by its relatively narrow bicolored leaves, axillary and terminal inflorescences, and long petioles with laterally attached apical petiolar glands. The habitats reported on the labels are "igapó" (both of the Archer and Goulding collections), "várzea" (Capucho 328) and "swampy land" (Capucho 531). However, until recently the terminology of inundated forest in Amazonia has not been standardized (Prance, 1979), and the actual habitat is probably more restricted than the labels would indicate. The Rio Tapajós is a clear water river, and the adjacent floodplain would therefore fall into "seasonal igapó" in Prance's classification. Archer reports on the label of no. 8361 that the seeds are eaten by fish, a phenomenon that has recently been studied among Amazonian flood-plain species by Goulding (1980).

Common names reported for this species are "tararuginha da praia" (Archer 8361, 8409) and "tararuginha" (Capucho 328, 531).

Additional specimens examined. BRAZIL. AMAZONAS: Itacoatiara, Beira de Amazonas, 1 July, 1913, Ducke s.n. (MG-12473, not seen, F neg. 45808; fragment, F). PARÁ: Fazenda Urucuritiba, opposite Fordlândia on Rio Tapajós, 13 April 1943, Archer 8361 (F); E of Fazenda Urucuritiba, on Rio Tapajós, opposite Fordlândia, 17 April 1943, Archer 8409 (F); Tapajós, Itaituba, 27 July 1932, Capucho 328 (F); Tapajós, Boa Vista, 2 Jan. 1933, Capucho 531 (F); Óbidos, Beira de Amazonas, 9 March 1909, Ducke s.n. (MG-10223, not seen, F neg. 45809; fragment, F). RONDÔNIA: Rio Machado, curso inferior, Jan. 1981, Goulding 1239 (MG).

SAPIUM RIGIDIFOLIUM Huft, sp. nov. TYPE: Costa Rica.

Heredia: pastures above Río San Rafael, 3 km W of Vara Blanca, 1750 m, 8 Aug. 1971, R. W. Lent 2041 (holotype, F-1783961, F neg. 62130; isotypes, MO, NY, US), distributed as Sapium thelocarpum Schum. & Pittier.

Arbor ad 20 m alta. Petioli 1-2.5(-5) cm longi, canaliculati; glandulae apicales ad partem decurrentum laminae affixi; lamina chartacea, rigida, elliptico-oblonga, nervis utroque costae laterae (20-)30-40, prominentibus, rectis, sub angulo paene 90° abeuntibus; apice obtusa vel rotundata, plana, margine modice crenata, basi cuspidata aliquantum decurrens. Spicae apicales solitariae bisexuales. Floribus masculinis 5-8 aggregatis, calyce bilabiato, staminibus 2. Floribus femineis 4-10. Capsula late ovoidea vel suborbiculata, stipitata, columna styli persistenti. Semina matura non visa, ut videtur ovoidea complanata verrucata.

Tree to 20 m; monoecious. Leaves chartaceous, rigid; petiole 1-2.5(-3) cm long, canaliculate, the 2 apical glands opposite or subopposite, attached to the decurrent laminar tissue, ca. 1 mm in diameter, stipules deltate, 2-2.5(-3) mm long, 1.5-2 mm wide, the margin hyaline; blade elliptic-oblong, 5-11 cm long, 2-4.5 cm wide, 2.1-2.7 times as long as wide, glabrous; midvein prominent below, the secondary veins (20-)30-40 per side, prominent, diverging from the midvein at nearly right angles, straight, connected by a prominent reticulum, breaking up before reaching the margin; base cuspidate, slightly decurrent; margin shallowly crenate; apex rounded or obtuse, plane. Spikes solitary at the apex of lateral shoots, to 9 cm long, bisexual. Staminate flowers in groups of 5-8, the subtending bracts short, broad, rounded, ca. 1 mm long, 1-1.5 mm wide, biglandular, the glands suborbicular, 1.5-2 mm in diameter, flattened; calyx cupular, 1.5-2 mm long, 2-lipped; stamens 2. Pistillate flowers 4-10, solitary at basal nodes, the bracts and calyces as in the staminate flowers; ovary and styles not seen; style-column persistent on mature fruits. Capsule broadly ovoid to suborbicular, 6-8 mm long, smooth, thin-shelled, stipitate, the stipe 2-4 mm long; mature seeds not seen, apparently ovoid, flattened laterally, the surface warty.

This species was recognized as new by Jablonski (1968) in a treatment of the Caribbean species of *Sapium*, where he refrained from naming it because of the lack of good material, but surmised that it was related to the Cuban endemics, *S. daphnoides* Griseb. and *S. moasense* Alain. Now that much new material, including fruiting collections, from both Panama and Costa Rica has become available, it is clear that *S. rigidifolium* is not at all closely related to the Cuban species, but belongs instead to section *Emmenostylum* Hemsley, characterized by persistent style bases on the

mature fruits. Only four species have previously been described in this group, all from high elevations in the northern Andes. Two of these, S. stylare Muell. Arg. and S. putumayense Croizat, have auricular leaf bases, as does S. solisii Huft, described below. The others, S. verum Hemsley and S. tolimense Jumelle, are similar to S. rigidifolium in lacking auriculate leaf bases. There is some doubt as to the distinctiveness of the latter two species (see Croizat, 1943, for a discussion of these species), but both are clearly different from S. rigidifolium. The leaves of the South American species are longer (10-15 cm in S. verum, 15-18 cm in S. tolimense, vs. 5-11 cm in S. rigidifolium), the fruits are larger (8-10 mm long vs. 6-8 mm), the transition between the capsule proper and the persistent style base is gradual rather than abrupt as in S. rigidifolium, and the style base is longer (3-4 mm vs. 1.2-1.5 mm) and thicker (2-2.5 mm vs. 0.7-0.8 mm). Furthermore, the leaves of S. rigidifolium are more conspicuously bicolored than are those of the South American species, shiny above, and of a thicker texture.

Sapium rigidifolium is illustrated in Webster & Huft (in press).

Additional specimens examined. COSTA RICA.

ALAJUELA: Fila Volcán Viejo, San Carlos, 1800-2000 m, 11-14 Feb. 1986, Gomez-Laurito 11109 (F); Viento Fresco, 1600-1900 m, 13 Feb. 1926, Standley & Torres 47896 (F, F fragment). CARTAGO: Guarco, El Empalme, 2222 m, 4 Jan. 1967, González X-25-RMG-42 (CR, F, NY), X-25-RMG-43 (USJ-4822); near La Sierra, ca. 25 km S of Cartago, Cordillera de Talamanca, 2000 m, 23 Jan. 1965, Williams et al. 28121 (CR, F, MICH). Boundary between provinces ALAJUELA, PUNTARENAS, and GUANACASTE: Monteverde, Cordillera de Tilarán, 1540-1600 m, 12 July 1976, Dryer 434 (CR), 15 Aug. 1976, 592 (F), Nov. 1977, 1692 (CR, F, MO).

PANAMA. CHIRIQUÍ: Guadalupe Arriba, above Cerro Punta, 8°52'N, 82°33'W, 2100 m, 23 July 1985, de Nevers & Charnley 6057 (F); Boquete, Cerro Horqueta, 5000-6000 ft, 8 Aug. 1967, Dwyer & Hayden 7685 (MO); Cerro Punta, 2000 m, 14 Sept. 1971, Lao 391 (MO); slopes of Volcán Barú, near town of Cerro Punta, 6000 ft, 7 June, 1957, Stern & Chambers 85 (A, MO, US).

SAPIUM SOLISII Huft, sp. nov. TYPE: Ecuador. Pichincha: Quito, 2850 m, 20 Aug. 1949, M. Acosta Solis 13547 (holotype, F-1552477, F neg. 62132).



Arbor; ramuli crassi nodosi approximati, surculi laeves ad apicem ramorum interdum aggregati. Petioli 6-12 mm longi; glandulae apicales cylindricae, infra laminam 1-2 mm; lamina membranacea, oblonga vel oblongo-obovoida, nervis utroque costae laterae 18-24, conspicuis, infra prominulis, quam costa multo tenuioribus, rectis, sub angulo paene  $90^{\circ}$  abeuntibus, apice rotundata, plana, basi obtusa bilobata glandulosa, margine serrulata dentibus setiformibus. Spicae axillares solitariae bisexuales pedunculatae, floribus masculinis 4 vel 5 aggregatis calyce bilabiato staminibus 2, floribus femineis 4-6. Capsula ovoideoglobosa, sessilis, columna styli persistenti; semina ovoidea, complanata, rugosa, nigra.

Tree; monoecious; branchlets thick, knobby from petiolar stumps and persistent stipules, closely spaced; smoother long shoots sometimes crowded near apex. Leaves alternate; petiole 6-12 mm long, the 2 apical glands opposite or subopposite, cylindrical, 0.8-1 mm long, at right angles to petiole or widely ascending, 1-2 mm below blade; stipules persistent, broadly deltate, ca. 4 mm long, 3.5-4 mm wide, the base auriculate; blade membranous, oblong to oblong-obovoid, 2.7-4.8 cm long, 1.4-3.2 cm wide, 1.8-2 times as long as wide; midvein conspicuous, prominulous below, the secondary veins 18-24 on a side, much thinner than the midvein, conspicuous, prominulous below, diverging from the midvein at nearly right angles, straight, connected by a fine reticulum; apex rounded, plane; base obtuse, glandular-auriculate; margin serrulate, the teeth setiform, ascending. Spikes axillary, solitary, bisexual, pedunculate, ca. 3 cm long at anthesis, the persistent fruiting portion to 5 cm long at maturity. Staminate flowers in groups of 4 or 5, the subtending bract flabellate, rounded, 1-1.2 mm long, entire or slightly erose, biglandular, the glands suborbicular to oblong, (1.5-)2-3 mm long, 1.5-2.5 mm long; calyx cupular, ca. 1.5 mm long, 2-lipped; stamens 2. Pistillate flowers 4-6, solitary at basal nodes, the bracts as in the staminate flowers; calyx deeply lobed, the lobes hardly exceeding the bracts; styles 3, 4-5 mm long, joined at base, only slightly divergent, the column persistent on mature fruit. Capsules ovoid-globose, ca. 1.5 cm in diameter, sessile, obtusely 3-angled, wrinkled, drying black, the persistent style-column 3.5-4 mm long; seeds ovoid, laterally compressed, 5-6 mm in diameter, rough, black.

As mentioned above in the discussion of *Sapium rigidifolium*, *S. solisii* belongs with the auriculate-

leaves species of section Emmenostylum. Both of the other species, however, have much larger leaves (8-12 cm in S. stylare, 15-18 cm in S. putumayense, vs. 2.5-5 cm) with longer petioles. Sapium stylare has smaller capsules (to 5 mm diam. vs. ca. 15 mm diam.). Sapium putumayense, on the other hand, which is unknown to me, has fruits that are considerably larger (2.5-3 cm in diameter) than those of S. solisii.

Sapium solisii is known only from the type.

#### LITERATURE CITED

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